

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
25 May 2001 (25.05.2001)

PCT

(10) International Publication Number
WO 01/35714 A2

(51) International Patent Classification: Not classified

(21) International Application Number: PCT/IB00/01046

(22) International Filing Date: 14 July 2000 (14.07.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
99 1 23872.9 15 November 1999 (15.11.1999) CN
60/212,907 20 June 2000 (20.06.2000) US

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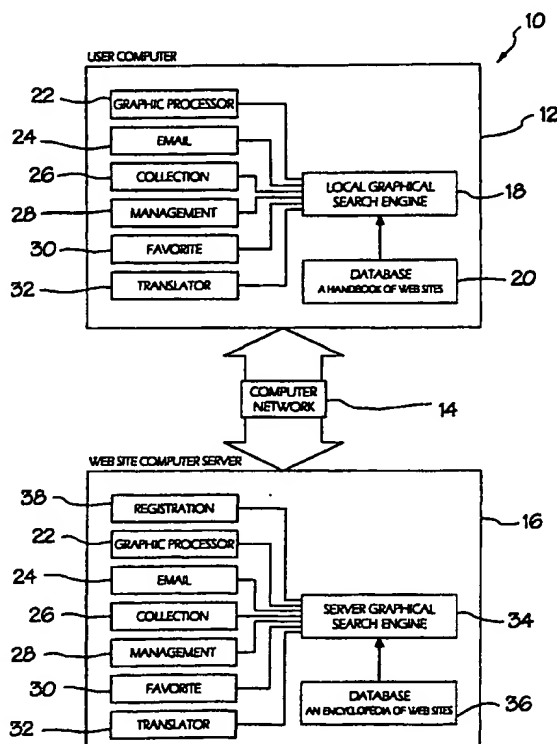
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(81) Designated States (national): AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,

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(54) Title: A GRAPHIC LANGUAGE REPRESENTATION AND COMMUNICATION METHOD/SYSTEM AND ITS APPLICATION TO A GRAPHIC NAVIGATION METHOD FOR RETRIEVING INFORMATION IN A COMPUTER DATABASE AND AN INTERNET SEARCH ENGINE



(57) Abstract: Computer search engines and databases operating in a network or in the Internet are operationally indifferent to whether the information which is searched, stored, or indexed to identify a web site is understandable by human users as text or as abstract or graphic information. Thus, the invention associates with each site on the network, or web site on the internet, one or more graphic images which connote the content of the web site, its owner, or some other characteristic associated with it which is of interest to those who search the network. An encyclopedia of graphic images is organized according to logical concepts or assigned to index the sites in a hierarchical structure. Graphic images displayed on a local search engine's input screen are then selected in conformity with the hierarchical structure to formulate a specific search request. The local search engine then searches a local database to find the multilevel, hierarchical graphic identification of the site. If found then the local search engine is connected to the site and is free to browse it. If not found, then the local search engine is connected via the network to a server search engine, which searches a much larger server database for the same specific graphic request. If found, the user accesses the site and is free to browse it. In this manner, a network can be searched without necessary recourse to any specific language, but based solely on conceptual structures.

WO 01/35714 A2



IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

— *Without international search report and to be republished upon receipt of that report.*

5 **A GRAPHIC LANGUAGE REPRESENTATION AND COMMUNICATION
METHOD/SYSTEM AND ITS APPLICATION TO A GRAPHIC NAVIGATION
METHOD FOR RETRIEVING INFORMATION IN A COMPUTER DATABASE AND
AN INTERNET SEARCH ENGINE**

10 **Background of the Invention**

Related Applications

The present application is related to U.S. Provisional Patent Application
entitled _____, serial no. _____, filed on _____
2000.

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1. *Field of the Invention*

This invention relates to the field of a graphic language representation and
communication methods in computer networks and in particular to graphic
navigation/search methods for retrieving information in computer databases and
20 Internet search engines.

2. *Description of the Prior Art*

The Internet, which is a global distributed computer network, has extended to
almost every corner in the world. As the Internet expands, the information available
25 on the Internet becomes enormous and the number of web sites of various types

grows exponentially. Therefore, because of the sheer size of the distributed database which the Internet comprises, it is much more difficult for Internet users to find information efficiently and effectively. To help people search information on Internet, many web sites have emerged which provide web information search engines based
5 on traditional text-based key word searching methods and/or category clarification search methods. Among the well-known web sites are Yahoo, Lycos, and Infoseek, etc.

In addition to text information, various multimedia information and subject-specific information are available over Internet. This involves subjects such as
10 movies, television, photograph, music, games, touring, car, mathematics, physics, chemistry, plants and animals etc. In order to retrieve a wide range of information from different natural language web sites, some Internet Service Providers (ISP's) have built a dozen of separate search engines based on different languages. These individual search engines were not designed based on a coherent structure,
15 therefore, people can not search web information from different countries as a whole and they can not use and share information from different search engines. With more than 200 frequently used languages in the world, people who only know their native language will have great difficulties to retrieve web information from other foreign languages. Furthermore, it is difficult for people to search information in a specific
20 subject they are not familiar with, since the vocabulary and key words in each subject field tends to be specific to each subject field instead of being universally logical.

To solve this problem, the present invention provides a graphic language representation and communication method and practical graphic navigation/search methods for retrieving information in computer database and Internet search engine.

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Brief Summary of the Invention

Computer search engines and databases operating in a network or in the Internet are operationally indifferent to whether the information, which is searched, stored, or indexed to identify a web site, is understandable by human users as text or as abstract or graphic information. Thus, the invention associates with each site on the network, or web site on the internet, one or more graphic images which connote the content of the web site, its owner, or some other characteristic associated with it which is of interest to those who search the network. An encyclopedia of graphic images is organized according to logical concepts or assigned to index the sites in a hierarchical structure. Graphic images displayed on a local search engine's input screen are then selected in conformity with the hierarchical structure to formulate a specific search request. The local search engine then searches a local database to find the multilevel, hierarchical graphic identification of the site. If found then the local search engine is connected to the site and is free to browse it. If not found, then the local search engine is connected via the network to a server search engine in the central web site, which searches a much larger server database for the same specific graphic request. If found, the server search engine again accesses it and is free to browse it. In this manner, a network can be searched without necessary recourse to any specific language, but based solely on conceptual structures.

20

The invention comprises a user computer system (e.g., a PC or any equipment accessible to Internet), a computer network, and a web site computer server system. The user computer system comprises a graphic search engine, which is a graphically navigated web browsing system, a database, an electronic mail software module, a web site address collection and editing software module, a graphic information resource classification and management software module, a user's personal favorite web site collection and editing software module, and a multi-lingual translator, and other client software modules as are known to the art. The computer network is used for transferring information and accessing the Internet. The web site computer server system comprises a database, a graphically navigated search engine, an electronic mail software module, a web site address collection and editing software module, a user's personal favorite web site collection and editing software module, a web site registration unit, a graphic information resource classification and management software module, and a multi-lingual translator, and other client software modules as are known to the art.

The graphic search engines in the user computer and the server computer are built based on two- and multi-dimensional graphic illustrations and the associated graphic language representation and communication methods. The database includes two- and multi-dimensional graphic illustrations, their coding information, the related Internet information resource (e.g., web sites), and associated transmission information. The graphic search engine processes the user's selection represented in various graphic forms. The computer network is used for transferring information and accessing the Internet.

The use of graphic language representation and communication method for computer database and Internet information retrieval described in this invention is a novel graphic method for collecting, representing, compiling, categorizing, editing, searching, and retrieving information. The graphic method is built upon the natural, inherent graphic relationship among the contents of multiple two and/or multi-dimensional graphic illustrations. The method can express the natural language meaning of words in a computer database and in an Internet information resource (e.g., web sites) using multiple graphic illustrations. The multiple two-dimensional graphics can also be used to express the natural language meaning of a paragraph or an article in the computer database and in Internet information resource (e.g., web sites).

These two- and multi-dimensional graphic illustrations can be graphic drawings and/or images expressed in various visual forms, such as rows, rings, radiation patterns, two-dimensional arrays, rotation patterns and other graphic patterns, or a combination of the above illustrations. These drawings and images may be black and white or in color. They can be virtual or real graphics, or a combination of both. These graphic illustrations can be interactive multimedia including for example sound, music, animations, games, or video sequences.

The method includes associating each of the sites in the distributed computer network with a commercial graphic with each site uniquely associated with a commercial entity associated with the site.

There is a hierarchical indexing software module linking graphic representations and illustrations at the different levels of the graphic search engine. A graphic indicator (e.g., a picture, a portion of a picture, or an icon) can represent a specific subject or a group of subjects, a topic or a group of topics or a web site or a group of web sites. Graphic indicators at the higher level of the hierarchy may be comprised of mainly pictures or portions of a picture. Graphic indicators at the lower level of the hierarchy (e.g., an icon) may be comprised of the name of the web site, its logo or feature pictures, company introduction, specific web site evaluation parameters (e.g., web site usage frequency, reputation ranking, hit rate, or traffic flow), some advertising media or a combination of the above. The indexing relationship for various graphic indicators can be coded in any appropriate form such as linear, tree structured, network structured, and/or hierarchical formats. Some examples of the indexing methods include alphabetical ordering, balanced tree and unbalanced tree coding (e.g., Huffman coding) according to some specific web site evaluation parameters (see above). These coding methods help store, represent, compile, categorize, edit, search, retrieve, manage and display these graphic illustrations.

The invention presents a language-independent, graphic search engine which can collect, represent, compile, categorize, search, retrieve, and manage Internet information resource (e.g., web site information) in a general and uniform structure. It replaces the lengthy web search time (particularly in the developing countries due to limited networking communications infrastructure) by a quick book browsing operation, dramatically reducing the operation cost. Browsing web pages using the said graphic search engine requires the use of only one mouse. This makes it a user-

friendly tool not only for kids, seniors, beginners, and people having little education, but also for professional users. The graphic search engine is much simpler than the pure text-based searching systems and allows users to find Internet information in a much efficient manner. Besides, it also contains a multi-lingual translator capable of translating web content information into different languages. This helps the use and share of Internet information resource from different languages and countries.

Thus, the invention is defined as a method of accessing a site in a distributed computer network which includes a plurality of sites. The method comprises the step of associating each the site in the distributed computer network with at least one unique graphic identifier. A local database is provided of the unique graphic identifiers related to at least some of the sites in the distributed computer network. A local search engine is provided for searching the local database for one of the sites in the distributed computer network. The local database is searched based on selected graphic input provided to the local search engine.

The step of associating each site in the distributed computer network with an unique graphic identifier associates more than one unique graphic identifier with each site, preferably in a predetermined hierarchical ordering relationship among the plurality of unique graphic identifiers. The predetermined hierarchical ordering of the plurality of unique graphic identifiers with each the site orders the hierarchical ordering of unique graphic identifiers according to a conceptual logical order graphically represented by the plurality of unique graphic identifiers.

The method further comprises the steps of providing a server database of the unique graphic identifiers related to the sites in the distributed computer network; providing a server search engine for searching the server database for one of the sites in the distributed computer network; and searching the server database based on selection of a graphic input to the server search engine. The server database is searched based on selection of a graphic input to the server search engine only if searching the local database based on selection of a graphic input to the local search engine fails to locate the site on the local database. Thus, a two step search of the internet in a two tiered database is performed. Namely the search of the cache or local database first and then contingently of the server or accessible worldwide database.

The term, "conceptual logical order" is defined in this specification to mean any scheme of indexing the unique graphic identifiers. This includes but is not limited to indexing the unique graphic identifiers in a linear structure, tree structure, network structure, or hierarchical format. For example, ordering the unique graphic identifiers according to a conceptual logical order graphically represented by the plurality of unique graphic identifiers orders unique graphic identifiers by alphabetical ordering balanced tree and unbalanced tree coding, Huffman coding, or by specific web site evaluation parameters. The ordering of the unique graphic identifiers may also be organized by specific web site evaluation parameters orders the unique graphic identifiers by web site usage frequency, reputation ranking, hit rate or traffic flow.

Associating each the site in the distributed computer network with an unique graphic identifier comprises associating a colored or multiply colored image, a one,

two or three dimensional image, an image comprised of patterns of rows, rings, radiation patterns, two-dimensional arrays, rotation patterns, multimedia patterns or images, or a combination thereof with the site.

The illustrated embodiment shows a hierarchical ordering of the plurality of
5 unique graphic identifiers by country category graphic indicators, subject category graphic indicators, topic category graphic indicators, and web site graphic icon illustrations in the predetermined hierarchical ordering.

The invention is also defined as an apparatus for performing the above steps, namely an apparatus for accessing a site in a distributed computer network which
10 includes a plurality of sites comprising a local database in which are stored unique graphic identifiers related to at least some of the sites in the distributed computer network. Each of the sites in the distributed computer network is associated with an unique graphic identifier. A local search engine searches the local database for one of the sites in the distributed computer network based on selection of a graphic input
15 to the local search engine.

The apparatus further comprises a server database of the unique graphic identifiers related to the sites in the distributed computer network, and a server search engine for searching the server database for one of the sites in the distributed computer network. The server database based is searched based on selection of a
20 graphic input to the server search engine. The server database is searched based on selection of a graphic input to the server search engine only if searching the local database based on selection of a graphic input to the local search engine fails to locate the site on the local database.

The local and server search engine each comprise a language-independent graphic search engine able to collect, represent, store, compile, edit, search, retrieve, and manage computer database information and web site information using graphic illustrations.

5 In particular the network is the internet and the local search engine comprises a search engine, a web site address collection and editing software module, a user's personal favorite web site collection and editing software module, a graphic information resource classification and management software module, and a multi-lingual translator. The server search engine comprises a search engine, a web site
10 registration software module, an information resource classification and management software module, an electronic mail software module, and a multi-lingual translator. The server search engine is a top-level, web site, graphic server search engine and further comprises a plurality of local general and special search engines coupled thereto as second-level.

15 The local and server databases comprise a plurality of sub-databases partitioned according to the hierarchical ordering.

The local and server search engines generate a multimedia presentation in the form of graphics, text, voice, music or a combination thereof corresponding to an accessed unique graphic identifier.

20 The invention can now be better visualized by turning to the following drawings wherein like elements are referenced by like numerals.

Brief Description of the Drawings

Fig. 1 is a sample block diagram of an embodiment of a typical graphic search engine described in this invention.

Fig. 2 is a subset of a sample flowchart showing a typical two-tier Internet
5 search application of the graphic search engine.

Fig. 3 shows the main page of the graphic search engine described in this invention.

Fig. 4 shows a sample, categorized graphic search page showing some graphic indicators. The bottom of the left-hand side shows a set of two-column
10 subject category buttons. The right-hand side is an alternative (optional) graphic search page which includes all the subject category indicators from the left.

Fig. 5 shows a sample of the classified graphic search page for the first (i.e., opera and dancing) subject category.

Fig. 6 shows a sample of a typical search page for the small opera topic
15 category. It lists a set of web sites and the corresponding graphic icons for the small opera topic category.

Fig. 7 shows a sample of the classified graphic search page for the second (i.e., collection) subject category.

Fig. 8 shows a sample of a typical graphic search page for stamp topic
20 category. It lists a set of web sites and the corresponding graphic icons for the stamp topic category.

Fig. 9 is a diagram illustrating the hierarchy of graphic images used for a search in one embodiment of the invention.

Fig. 10 is a diagram illustrating a general tree-form hierarchy of graphic images used for a search in one embodiment of the invention in which the two level search algorithm is illustrated.

The invention and its various embodiments can now be understood by turning
5 to the following Detailed Description of the Preferred Embodiments.

Detailed Description of the Preferred Embodiments

The basic principle of the invention is to establish the relationship between graphic navigation illustrations and Internet information in the computer databases and networking system. The graphic interface illustrations in the graphic search
10 engine are carefully designed by a group of special experts or according to an international standards organization using graphic content information and the content information among multiple graphs, making them easily understandable and accessible to almost any person using an Internet browser. The graphic content
15 information guides the graphic search process. The database is set up together with an information database classification and management software module which categorizes the large amount of disordered Internet information into a hierarchical, orderly information retrieval system. The bottom level of the graphic search interface is associated with a set of graphically displayed web site icons, accomplishing the
20 goal of retrieving Internet resource information such as web sites.

Fig. 9 is a diagram which illustrates the graphic search algorithm of the invention. At a first level 100 of the hierarchy, e.g. a country level, the paths leading to the web sites located in various countries are represented by graphic icons, such

as the national flag, the country map or location on a world map. Assume that the button 102 associated with China were selected. A plurality of subject level graphic icons 104 would then be displayed, e.g. icons depicting stamps 106, art 108, sports 110 and a plurality of other subjects. If the button for sports 110 were selected, then
5 in turn the next topic level 112 of images would be displayed, e.g. football 114, swimming 116, car racing 118 and a multiplicity of other topics. Up to this point no words would be displayed and the communication between user and computer would be undertaken entirely in graphic terms. Although graphic images are inherently ambiguous to a degree and may not be immediately interpreted by each user in the
10 same way, the multiplicity of graphics in each lower level corresponding to a graphic in a next higher level defines each graphic for the user in conceptual terms. A brief period of use of the graphic hierarchical system soon equips the user with an exact conceptual referent for each icon. Ultimately a lower level 120 is reached in which the actual web sites 122, 124, 126 corresponding to a selected graphic can be listed
15 in a conventional word form in a manner similar to word-based search engines. In the illustration of Fig. 9 all the web sites in China relating to football will be displayed. The language in which these web sites will then be displayed can be chosen by the user by selection of any appropriate translator module as described below.

A special and important case in the graphic search engine is to use advertising
20 materials, such as company logo, flags, feature pictures, in the graphic indicators and illustrations. This is particularly effective when searching the large amount of web sites belonging to industrial companies and commercial organizations.

Graphic illustrations can be designed into a hierarchical and multilevel representation system. As shown in Figs. 3 - 8, in country category, for example, we use the Statue of Liberty and U.S. national flag to represent the United States, The Great Wall and Chinese national flag for China, and the Sydney Theater and Australian national flag for Australia (see Fig. 3). In the subject category, we use a swan in a ballet and a facial make-up pattern of a singer from the Beijing Opera to indicate a performing arts category; a Greek athlete casting a discus to represent sports, etc. These two- and multi-dimensional graphic illustrations are used as the search engine's graphic navigation interface for information retrieval (see Figs. 3, 4, 5, 6, 7, and 8). In Figs. 3-8, for example, clicking any of the graphic indicators (e.g., country category indicator, subject category indicator, or topic category indicator) or graphic buttons (e.g., web site icon) will lead or navigate a user quickly, going through various levels of graphic search interfaces, to find the required information.

Fig. 1 shows an embodiment of a typical open Internet graphic search engine system, generally denoted by reference numeral 10, which is a typical embodiment of the graphic language representation and communication system of the said invention. It is comprised of a user computer system 12 (e.g., a PC), a computer network 14, and a web site computer server system 16. User computer system 12 is comprised of a graphic search engine 18, which is a graphically navigated search engine of a database 20. Included within graphic search engine 18 is a graphic electronic mail software module 24, a graphic web site address collection and editing software module 26, a graphic information resource classification and management software module 28, a user graphic personal favorite web site collection and editing software

module 30, a multi-lingual translator 32, and other client software modules as are known to the art.

Graphic electronic mail software module 24 collects, packs, sends, receives and processes electronic messages having multimedia components such as images, sounds, music and video sequences. Because this type of multimedia messages can have a large size, this requires the mail software module to have the ability to process large mail intelligently. For example, if a message is too large to be sent, the mail software module partitions a large message into small pieces, sends each individual small mail to receiver side, and assembles them together after receiving all the small pieces.

Graphic web site address collection and editing software module 26 is an intelligent agent (an autonomous software program that travels on Internet) and which performs the following functions:

- (1) It finds and collects in each (country, subject and topic) category the new web sites;
- (2) It finds and collects the associated web site evaluation parameters(e.g., web site usage frequency, reputation ranking, hit rate, or traffic flow)for the new sites;
- (3) It adds these new web sites into the corresponding categories in the database 36 (some add to database 20);
- (4) It then ranks web sites (new and existing) in each category according to the web site evaluation parameters. This forms an indexed hierarchy. A typical embodiment of the hierarchy has four levels: country level, subject level,

topic level and web site level. Some examples of the indexing methods include alphabetical ordering at each level, balanced tree and unbalanced tree coding such as Huffman tree coding/ordering according to some specific web site evaluation parameters. Using hit rate as an example, Huffman tree coding means that the web site in each category with the highest hit rate is ranked first at the top row.

(5) It detects the unavailability of some web sites and removes them from the database.

Graphic information resource classification and management software module

28 performs two functions:

(1) Database 36 stores a large number of multimedia files such as graphic pictures, images, sounds, and music which will be used to construct the web site hierarchy. This software module provides multimedia resource classification and management methods for these multimedia files.

(2) The country-subject-topic-web site hierarchy built in databases 20 and 36 require a comprehensive and detailed classification for the information contents. Software module 28 performs this classification task.

User graphic personal favorite web site collection and editing software module 30 functions like "My Favorite" on conventional web browsers. If a user finds some web sites useful and would like to keep them, he can put a copy of them in software module 30 which appears like a file folder. One is free to add, remove and edit any web sites and their illustrations.

Multi-lingual translator 32 is capable of translating among different/multiple languages using a single software package. Due to the large size of the translation dictionary, generally a language translator has difficulty when it faces the multiple choice problem. Each category in the encyclopedia or database 20 or 36 contains
5 limited category context information for a specific subject or topic category (e.g., art, stamps, hospitals, or computers) which significantly limits the translation search space to a much smaller domain. This accordingly splits the corresponding built-in translation dictionary in translator 32 into a number of small, specialized dictionaries, each for a particular category. Due to this dramatically reduced search space, the
10 translation accuracy and efficiency in each category of the "web site encyclopedia" 36 can be significantly increased.

Computer network 14 is used for transferring information and accessing the Internet.

Web site computer server software module 16 is comprised of a database 36
15 for information and graphic (language) illustrations, a server graphic search engine 34, which similarly includes a graphic web site address collection and editing software module 26, a graphic information resource classification and management software module 28, a graphic electronic mail software module 24, a user graphic personal favorite web site collection and editing software module 30, a web site registration
20 unit 38, a multi-lingual translator 32, and other software modules known in the art for inclusion in a server system. Graphic web site address collection and editing software module 26, graphic information resource classification and management software module 28, graphic electronic mail software module 24, user graphic

personal favorite web site collection and editing software module 30 and multi-lingual translator 32 operate in server graphic search engine 34 in a manner analogous to their counterparts in the local graphic search engine 18.

Web site registration unit 38 is an online registration unit included in the graphical search engine to allow a user to freely register one's individual or company's web site, logos, feature pictures, and the related information. Through the web site registration, the unit can automatically store the user information into the graphical database and set up user web site icon with the user-specified illustrations and descriptions. In certain cases some web sites' registration would require an ethical and legal examination.

The hierarchical indexing and classification software module in the graphic searching/browsing software module uses a multi-level categorization system and efficient indexing/coding method. In a typical embodiment of the graphic search engine 18, 34 (Figs. 3 to 8), every category or sub-category, e.g., the country category, subject category, topic category, and web sites, is collected, compiled and edited by experts in their field who are familiar with the subject area. The contents of the related countries, subjects, topics, and web sites are categorized and edited in such a way that the various encyclopedias are compiled and edited. The novel graphic search engine 18, 34 therefore has organized a massive amount of the disordered Internet information resource into a graphically illustrated, orderly multi-dimensional "Web Site Encyclopedia," covering a wide spectrum of subject areas. The categorization system is adaptable and scalable to cover almost all the subject areas.

A remarkable feature of the novel graphic search engine 18 and 34 lies on its language-independent graphic searching method which can be implemented by using a language selector and a multi-lingual translator. It enables users having any language background to browse through any web site in any illustrated subject category and topic category in any foreign language. More than 35 percent of worldwide web sites are multimedia and graphic in nature, e.g., movie, sports, television, games, photograph, music, touring, stamps, collections, car, building, arts, performance, plant and animal, which can be read by any people who do not have sufficient literal language knowledge. Using a language selector, a user can select a different language first and then view the subject category, the topic category, and the web sites. The graphic search engine facilitates the use and sharing of Internet resource information in one single, coherent, and easy operational system. By adding a multi-lingual translator 32, this novel graphic search engine permits the users to view web sites in different languages, realizing the Internet spirit of sharing human knowledge in one world.

The classification and management software module for the graphic information resource includes a multi-lingual translator 32. It can translate the web content information into different languages according to countries. The graphic classification manager 28 categorizes a large amount of disordered Internet information (e.g., web sites) into a well-designed, language independent, graphic "Web Site Encyclopedia" or database 36.

The graphic search engine 18 installed on the user's personal computer includes a small number of web site collections that was selected from the large "web

site encyclopedia" 36 stored in the web site computer server system 16. It may be considered as a handbook version of the "web site encyclopedia," 36 i.e., a "Web Site Handbook" or database 20.

The illustrated graphic search engine 18, 34 which is a typical embodiment of the
5 graphic language representation and communication system, is built on an efficient two-tier search engine structure. It is comprised of: (1) a top-level, large, faster graphic search engine installed in the web site computer server system 16 (i.e., a server search engine 34); and (2) many second-level, small graphic search engines installed in the local users' computers 12 (i.e., local search engines 18). Fig. 10
10 diagrammatically illustrates the global and cache search capabilities of the invention. Once again the four level hierarchy of Fig. 9 is assumed, although any hierarchical system can be employed. Database 36 on the server will have the entire world of web sites graphically indexed and organized within it in the four tier system as indicated by the pyramidal outline 136. Thousands of graphic images, icons and
15 symbols will be employed to label the world database. Database 20 on the other hand, which is located on the user's system will serve as a much smaller cache or subset 120 of the same indexed world database 136 as diagrammatically indicated by the dotted lines. Cache 120 will thus be defined for the specific user according to actual use and/or with a preselected subset provided to the user, which may then be
20 user modified. Thus the subset 120 of the world database 136 which is most often used by the user will be more conveniently and quickly searched by the user in the local system. If the desired site cannot first be found in cache 120, then the user will

move to world database 136 to search the more extensive or entire hierarchical system.

Both server search engine 34 and local search engine 18 have similar components/units, structure, and functionality except for a few differences, which can be summarized as:

(1) Server search engine 34 uses the complete web site encyclopedia 36 which contains a massive amount of worldwide web site information in many different foreign languages. Local search engine 18 uses a handbook of well selected web sites (normally) in one or a few different languages selected by the user.

(2) Server search engine 34 must be responsible for many top-level, central coordination tasks such as user registration, web site updating, and other web site administrative functions. Local search engine 18 has more userfriendly facilities and will be able to connect to server search engine 34 automatically whenever necessary.

(3) Local search engine 18 performs an offline graphic search. It is in fact a quick book browsing process and is much more efficient particularly on a local computer 12. Server search engine 34 does an on-line graphic search which is slower but more comprehensive than that of local search engine 18.

The local search engine has a "web site handbook" or database 20 which supports one or a few different foreign languages. Because handbook or database 20 stores sufficient, frequently used web site information in a local computer (like in a cache), in

most cases, local user search engine 18 is able to find the web site information locally much more quickly. This two-tier search engine is very efficient in practice.

However, when the user wants to find much more information or wants to find information from more countries/languages, then he may be required to use server
5 search engine 34.

A two-tier Internet search algorithm was developed directly from the two-tier search engine structure, as follows:

- (1) A user first uses local graphic search engine 18 on a local computer 12 to search and browse Internet information from "web site handbook" 20. If the
10 information is found, search engine 18 finishes the internet connection and operational functions in a conventional manner.
- (2) If local search engine 18 cannot find the required information from handbook 20, it will automatically connect local search engine 18 to server search engine 34 which will search and browser Internet information from
15 "web site encyclopedia" 36.

There are two special cases for this algorithm:

- (1) A user can bypass local search engine 18 and can directly use the web site server search engine 34. This would be done, for example, when local
20 search engine 18 is not accessible to the user and he remotely accesses web site server search engine 34 from another computer in which local search engine 18 is not loaded.

(2) In both local and server graphic search engines 18, 34, there is a built-in functional category containing numerous general and special search engines, including a search engine's engine. In other words, general word-based search engines exist which can search the world wide web for general topics, such as yahoo, and the like. In addition there are many special search engines which have been designed to search and find web sites on special topics, such as medicine, sports, art and the like. Search engines 18, 34 are capable of selectively and appropriately accessing and using both general and special search engines to find sites based on the selected graphic hierarchies contained within them.

Fig. 2 diagrammatic illustrates the two level search algorithm. The search starts at step 100 by entering the local search engine 18 at step 102. A graphic search page or pages is displayed at step 104 and the user makes his or her selection to formulate a specific search request. The local database 20 is graphically searched for the specific search request and if found at step 106 the local user 12 can connect to the web site for conventional communication. If not found, then server search engine 34 is entered through Internet 14 at step 108. A graphic search page or pages, which may be different from that displayed at step 104, may now be displayed at step 110 to represent the wider search choices available in server database 36. If found, then the server search engine connects at step 112 to the site in a conventional manner for conventional communication therewith at step 114.

Therefore in the following, we do not distinguish the local and server graphic search engines 18, 34. Their function can be clarified from the context.

The search engine 18, 34 is built based on two- and multi-dimensional graphics and the associated graphic language representation and communication method/system. The databases 20, 36 include two- and multi-dimensional graphic representations, their coding information, the related Internet information resource (e.g., web sites), associated transmission information, and other web information. The search engine 18, 34 processes a user's search request represented in various graphic forms. The computer network 14 is used for transferring information and accessing the Internet. There is a hierarchical indexing system linking graphic illustrations at the different levels of graphic search engine 18, 34. An indicator (e.g., an icon) can represent a specific subject or a group of subjects, a topic or a group of topics, and/or a web site or a group of web sites. Graphic indicators at the higher level of the hierarchy may be comprised of mainly pictures or portions of a picture. Graphic indicators at the lower level of the hierarchy (e.g., an icon) may be comprised of the name of the web site, its logo or feature pictures, company introduction, specific web site evaluation parameters (e.g., web site usage frequency, reputation ranking, hit rate, or traffic flow), some advertising media or a combination of the above. Both search engines 18 and 34 include a web page content translator for different languages and countries. When the user clicks a graphic category indicator or a graphic web site icon, a brief description of that particular indicator or icon will be available in the form of text, voice or music or a multimedia combination of these to help user understand its meaning.

Graphic search engine 18, 34 described in this invention can be used as the basic web browsing platform for any computer system. The graphic language representation and communication method/system used in the search engine can also be used as a general graphic information receive and display system for Internet and any electronic message displaying system. The personal web site collector allows a user to collect, categorize, edit, and keep a set of favorite web sites. The graphic language representation and communication method or system and its application to a typical graphic search engine 18, 34 described in this invention support a series of current and future computing, networking, communications, and information processing technologies. This includes almost all the technologies requiring electronic displaying, e.g., television, telephone, PDA (personal digital assistant), vehicular information pads, cellular phones, banking machines, toys, etc. Graphic search engine 18, 34 can store graphic information in different storage medium, such as magnetic disks, tapes, laser disks and so on. System 10 is also employed in various LAN and WAN network communication systems.

Example 1 (see attached Figs. 2, 3, 4, 5, and 6):

In a typical embodiment of a graphic search engine 18, 34, to search for a web site about Chinese brief Opera, a user first enters a main graphic page of a local search engine 18 (Fig. 3) and selects China by clicking the China map/flag icon on the country category selection page, then a list of subject category graphic indicators appears (Fig. 4). The user then clicks the Opera subject category graphic indicator (a picture of a dancer and a facial make-up of Beijing Opera), and the next level of topic

category graphic search page appears (Fig. 5). Once having selected the Chinese brief Opera graphic indicator (i.e., an icon of a performing girl sitting down on an object), search engine 18 enters a collection of the web site icons belonging to this topic category (Fig. 6). After the user clicks a specific web site icon, it will enter the
5 selected web site and read the contents of the web.

Example 2 (see attached Figs. 2, 3, 4, 7, and 8):

Following a similar procedure in Example 1, an American can use the local search engine to find U.S. stamps. Now the user would like to find out some Chinese
10 stamps, but his local search engine does not contain any Chinese stamp information.

When the user enters the main graphic search page on search engine 18 (Fig. 3) and selects United States by clicking U.S. national flag icon on the country category selection page, the local search engine realizes the unavailability of Chinese information and automatically connects to the server search engine through the
15 Internet. Then a graphic search page with a list of subject category graphic indicators appears (Fig. 4). The user then clicks the collection subject category graphic indicator, i.e., an icon with a stamp picture, then the next level graphic topic category selection page appears (Fig. 7). Select the stamp topic graphic indicator, i.e., click the 8-cent stamp icon, the server search engine will display a collection of the web
20 site icons belonging to this topic category (Fig. 8). The user can select any web site to view Chinese stamp information.

During the searching/browsing process, the user may return to any level of graphic search page at any time to search/browse any specific category. This

graphic information representation, communication and retrieval method applies to any kind of computer database systems and to any type of computer networks such as LANs, WANs, and Internet.

If an individual or a company user would like to register personal or a
5 company's web site information into the search engine 34, one can do this in the registration page. The related information, such as the company name, logo, feature picture, web site address, email address of the correspondent, company introduction information, and the main web page description of the company will be filled in the registration form. After clicking a confirmation icon, it will send the information in the
10 form to the system administrator. The system administrator will exam the icon's quality and information contents, and categorize the icon into an appropriate category based on experts' suggestions. After this is completed, the register system will inform the users via email notifications.

Thus, it can now be appreciated that the invention includes the following
15 elements:

(1) Search navigation based on the content of the graphic information and the content of the information among multiple graphics, i.e. the graphic information in lower levels of the hierarchy serve to define the meaning of graphics at higher levels in the hierarchy. In theory, a graphic image is not universally
20 adapted to be used as a communication tool since it may have multiple meanings. Each picture in the graphical search engine of the invention is specially designed to convey an accurate meaning to the local user since our method not only based on each graph's content information but also the

content information among multiple graphic images in related levels. Each image in the graphic presentation has a limited meaning. A collection of images contribute to or define the meaning for a category.

- 5 (2) Separate information in two parts: a local "cache" storage for a frequently used handbook and a server storage of the complete encyclopedia. While keeping all the information might make a system slow, it is innovative to make use of a hierarchy and the local caching of portions of the hierarchy. This is the base for the design of the two-tier system. The local database 20 is actually an efficient local cache.
- 10 (3) Company advertising materials are used as graphic indicators and navigation clue. In the illustrated graphical search engine, particularly at the lower level of the hierarchy (see Figs. 6 and 8), the graphic indicators can demonstrate a company's logo or a company's feature picture. Since the graphical illustrations are beautiful, interesting, and entertaining, users enjoy seeing
- 15 them. This method makes an innovative use of company advertising materials as search navigation guide.
- (4) Language independence due to (1) a language selector or (2) a multilingual translator.
- (5) An efficient, two-tier database structure, namely a local cache database
- 20 customized to the user, and a worldwide database.
- (6) A two-tier Internet search algorithm, namely a local cache search contingently followed by a worldwide search .

(7) Both local and server search engines have access to and use both conventional general and special word-based search engines, in addition to the graphic search engine.

Many alterations and modifications may be made by those having ordinary skill in the art without departing from the spirit and scope of the invention. Therefore, it must be understood that the illustrated embodiment has been set forth only for the purposes of example and that it should not be taken as limiting the invention as defined by the following claims. For example, notwithstanding the fact that the elements of a claim are set forth below in a certain combination, it must be expressly understood that the invention includes other combinations of fewer, more or different elements, which are disclosed in above even when not initially claimed in such combinations.

The words used in this specification to describe the invention and its various embodiments are to be understood not only in the sense of their commonly defined meanings, but to include by special definition in this specification structure, material or acts beyond the scope of the commonly defined meanings. Thus if an element can be understood in the context of this specification as including more than one meaning, then its use in a claim must be understood as being generic to all possible meanings supported by the specification and by the word itself.

The definitions of the words or elements of the following claims are, therefore, defined in this specification to include not only the combination of elements which are literally set forth, but all equivalent structure, material or acts for performing substantially the same function in substantially the same way to obtain substantially the same result. In this sense it is therefore contemplated that an equivalent substitution of two or more elements may be made for any one of the elements in the

claims below or that a single element may be substituted for two or more elements in a claim. Although elements may be described above as acting in certain combinations and even initially claimed as such, it is to be expressly understood that one or more elements from a claimed combination can in some cases be excised
5 from the combination and that the claimed combination may be directed to a subcombination or variation of a subcombination.

Insubstantial changes from the claimed subject matter as viewed by a person with ordinary skill in the art, now known or later devised, are expressly contemplated as being equivalently within the scope of the claims. Therefore, obvious substitutions
10 now or later known to one with ordinary skill in the art are defined to be within the scope of the defined elements.

The claims are thus to be understood to include what is specifically illustrated and described above, what is conceptionally equivalent, what can be obviously substituted and also what essentially incorporates the essential idea of the invention.
15

We claim:

- 1 1. A method of accessing a site in a distributed computer network which
2 includes a plurality of sites comprising:
3 associating each said site in said distributed computer network with at
4 least one unique graphic identifier;
5 providing a local database of said unique graphic identifiers related to at
6 least some of said sites in said distributed computer network;
7 providing a local search engine for searching said local database for one
8 of said sites in said distributed computer network; and
9 searching said local database based on selected graphic input provided to
10 said local search engine.
- 1 2. The method of claim 1 where associating each site in said distributed
2 computer network with an unique graphic identifier associates more than one
3 unique graphic identifier with each site.
- 1 3. The method of claim 2 where associating more than one unique graphic
2 identifier with each site associates a plurality of unique graphic identifiers with
3 said site based on a predetermined hierarchical ordering relationship among said
4 plurality of unique graphic identifiers.

1 4. The method of claim 3 where associating a predetermined hierarchical
2 ordering of said plurality of unique graphic identifiers with each said site orders
3 said hierarchical ordering of unique graphic identifiers according to a conceptual
4 logical order graphically represented by said plurality of unique graphic
5 identifiers.

1 5. The method of claim 1 further comprising:
2 providing a server database of said unique graphic identifiers related to
3 said sites in said distributed computer network;
4 providing a server search engine for searching said server database for
5 one of said sites in said distributed computer network; and
6 searching said server database based on selection of a graphic input to
7 said server search engine.

1 6. The method of claim 5 wherein searching said server database based on
2 selection of a graphic input to said server search engine is performed only if
3 searching said local database based on selection of a graphic input to said local
4 search engine fails to locate said site on said local database.

1

2 7. The method of claim 1 further comprising accessing said site if found in
3 said local database and displaying said accessed site.

1 8. The method of claim 5 further comprising accessing said site if found in
2 said server database and displaying said accessed site.

1 9. The method of claim 7 further comprising browsing said displayed and
2 accessed site.

1 10. The method of claim 8 further comprising browsing said displayed and
2 accessed site.

1 11. The method of claim 1 further comprising indexing said unique graphic
2 identifiers.

1 12. The method of claim 11 where the indexing said unique graphic identifiers
2 comprises indexing said unique graphic identifiers in a linear structure, tree
3 structure, network structure, or hierarchical format.

1 13. The method of claim 1 where associating each said site in said distributed
2 computer network with an unique graphic identifier comprises associating a
3 colored or multiply colored image with said site.

1 14. The method of claim 1 where associating each said site in said distributed
2 computer network with an unique graphic identifier comprises associating a one.
3 two or three dimensional image with said site.

1 15. The method of claim 14 where associating a one, two or three dimensional
2 image with said site comprises associating an image selected from the group
3 comprising patterns of rows, rings, radiation patterns, two-dimensional arrays,
4 rotation patterns, or a combination thereof.

5 16. The method of claim 3 where associating a predetermined hierarchical
6 ordering of said plurality of unique graphic identifiers associates country category
7 graphic indicators, subject category graphic indicators, topic category graphic
8 indicators, and web site graphic icon illustrations in said predetermined
9 hierarchical ordering.

1 17. The method of claim 1 where associating each said site in said distributed
2 computer network with an unique graphic identifier associates with said site an
3 interactive multimedia image, colored image, virtual image, real and solid image,
4 or combination thereof.

1 18. An apparatus for accessing a site in a distributed computer network which
2 includes a plurality of sites comprising:

3 a local database in which are stored unique graphic identifiers related to at
4 least some of said sites in said distributed computer network, each said site in
5 said distributed computer network being associated with an unique graphic
6 identifier; and
7 a local search engine for searching said local database for one of said
8 sites in said distributed computer network based on selection of a graphic input
9 to said local search engine.

1 19. The apparatus of claim 18 where said local database has associated with
2 each site more than one unique graphic identifier at a different level of a
3 hierarchical system.

1 20. The apparatus of claim 19 where said local database has associated with
2 each site a plurality of unique graphic identifiers with said site based on a
3 predetermined hierarchical ordering of said plurality of unique graphic identifiers.

1 21. The apparatus of claim 20 where said local database has associated with
2 each site a hierarchical ordering of unique graphic identifiers according to a
3 conceptual logical order graphically represented by said plurality of unique
4 graphic identifiers.

1 22. The apparatus of claim 18 further comprising:

2 a server database of said unique graphic identifiers related to said sites in
3 said distributed computer network; and
4 a server search engine for searching said server database for one of said
5 sites in said distributed computer network, said server database being searched
6 based on selection of a graphic input to said server search engine.

1 23. The apparatus of claim 22 wherein said server database is searched
2 based on selection of a graphic input to said server search engine only if
3 searching said local database based on selection of a graphic input to said local
4 search engine fails to locate said site on said local database.

1
2 24. The apparatus of claim 22 where said local search engine accesses said
3 site if found in said local or server database and said local or server search
4 engine display said accessed site, respectively.

1 25. The apparatus of claim 24 where said local search engine browses said
2 displayed and accessed site.

1 26. The apparatus of claim 22 where said local and server database has
2 stored therein a plurality of indexed unique graphic identifiers.

1 27. The apparatus of claim 26 where said unique graphic identifiers are
2 indexed in said local and server database in a linear, tree structured, network
3 structured, or hierarchical format.

1 28. The apparatus of claim 22 where said local and server databases have
2 stored therein a colored or multiply colored image associated with said multi-level
3 subject categories.

1 29. The apparatus of claim 22 where said local and server databases have
2 stored therein a one, two or three dimensional image with said site

1 30. The apparatus of claim 29 where said local and server databases have
2 stored therein a one, two or three dimensional image selected from the group
3 comprising patterns of rows, rings, radiation patterns, two-dimensional arrays,
4 rotation patterns, or a combination thereof.

1 31. The apparatus of claim 18 where said server database has associated
2 with each site a hierarchical ordering of unique graphic identifiers according to a
3 conceptual logical order graphically represented by a plurality of unique graphic
4 identifiers, and where associating a predetermined hierarchical ordering of said
5 plurality of unique graphic identifiers in said local and server databases
6 associates country category graphic indicators, subject category graphic

7 indicators, topic category graphic indicators, and web site graphic icon
8 illustrations in said predetermined hierarchical ordering.

1 32. The apparatus of claim 18 where each said site in said distributed
2 computer network associated with an unique graphic identifier associates with
3 said site a colored image, virtual image, real and solid image, or combination
4 thereof.

1 33. The apparatus of claim 22 where said local and server search engine
2 each comprise a language-independent graphic search engine able to collect,
3 represent, store, compile, edit, search, retrieve, and manage computer database
4 information and web site information using graphic illustrations.

1 34. The apparatus of claim 18 where said network is the internet and where
2 said local search engine comprises a search engine, a web site address
3 collection and editing software module, a user's personal favorite web site
4 collection and editing software module, a graphic information resource
5 classification and management software module, and a multi-lingual translator.

1 35. The apparatus of claim 22 where said network is the internet and where
2 said server search engine comprises a search engine, a web site registration

3 unit, an information resource classification and management software module, an
4 electronic mail software module, and a multi-lingual translator.

1 36. The apparatus of claim 22 where said server search engine is a toplevel,
2 web site, graphic server search engine and further comprising a plurality of local
3 search engines coupled thereto as secondlevel.

1 37. The apparatus of claim 31 where said local and server databases
2 comprise a plurality of sub-databases partitioned according to said hierarchical
3 ordering.

1 38. The apparatus of claim 18 where said local search engine generates a
2 multimedia presentation in the form of graphics, text, voice, music or a
3 combination thereof corresponding to an accessed unique graphic identifier.

1 39. The apparatus of claim 18 where said server search engine generates a
2 multimedia presentation in the form of graphics, text, voice, music or a
3 combination thereof corresponding to an accessed unique graphic identifier.

1 40. The method of claim 1 where associating each said site in said distributed
2 computer network with an unique graphic identifier associates a commercial

3 graphic with each site uniquely associated with a commercial entity associated
4 with said site.

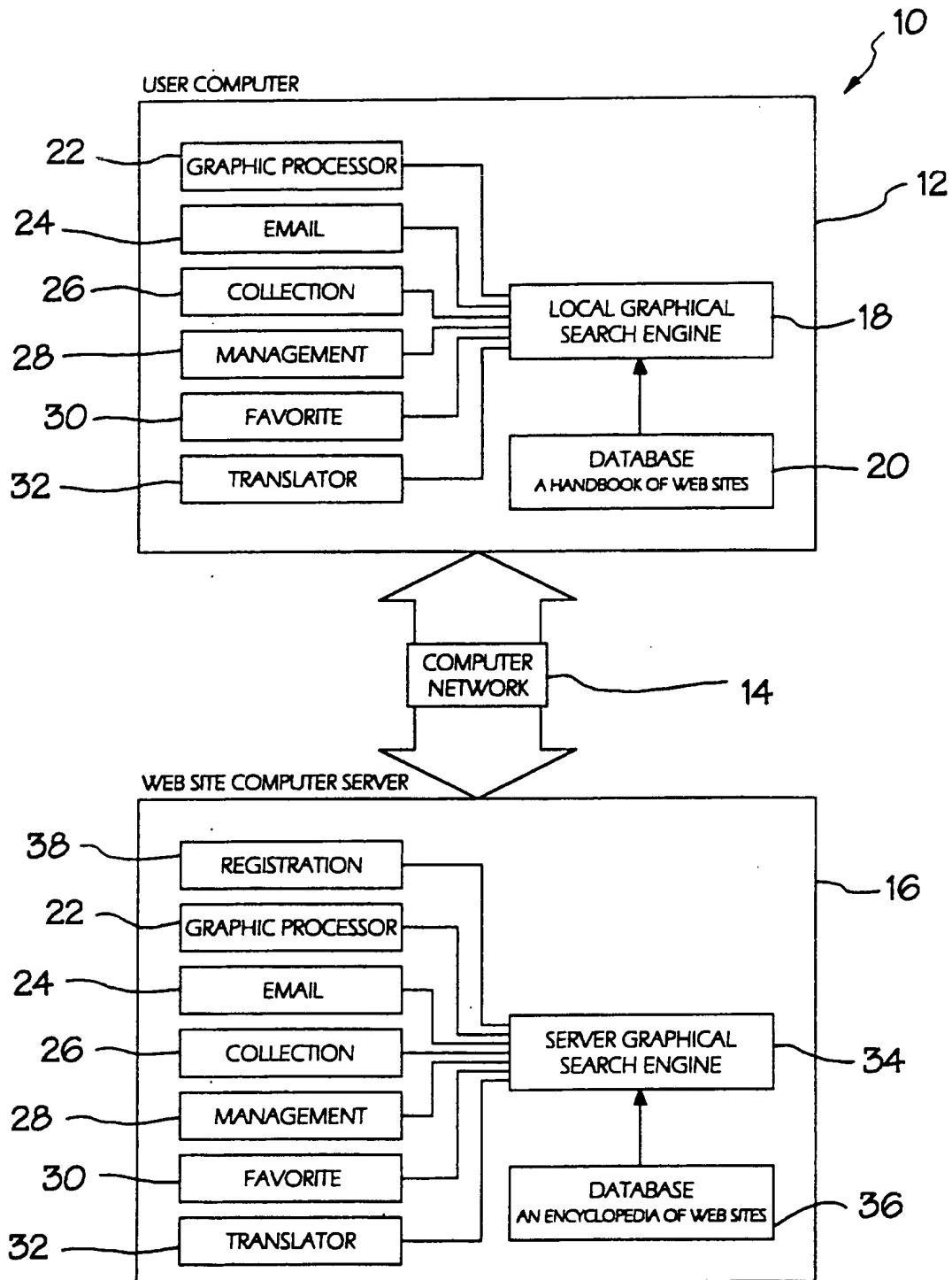
1 41. The method of claim 4 where ordering said unique graphic identifiers
2 according to a conceptual logical order graphically represented by said plurality
3 of unique graphic identifiers orders unique graphic identifiers by alphabetical
4 ordering, balanced tree and unbalanced tree coding, Huffman coding or by
5 specific web site evaluation parameters.

1 42. The method of claim 41 where ordering said unique graphic identifiers by
2 specific web site evaluation parameters orders said unique graphic identifiers by
3 web site usage frequency, reputation ranking, hit rate, or traffic flow.

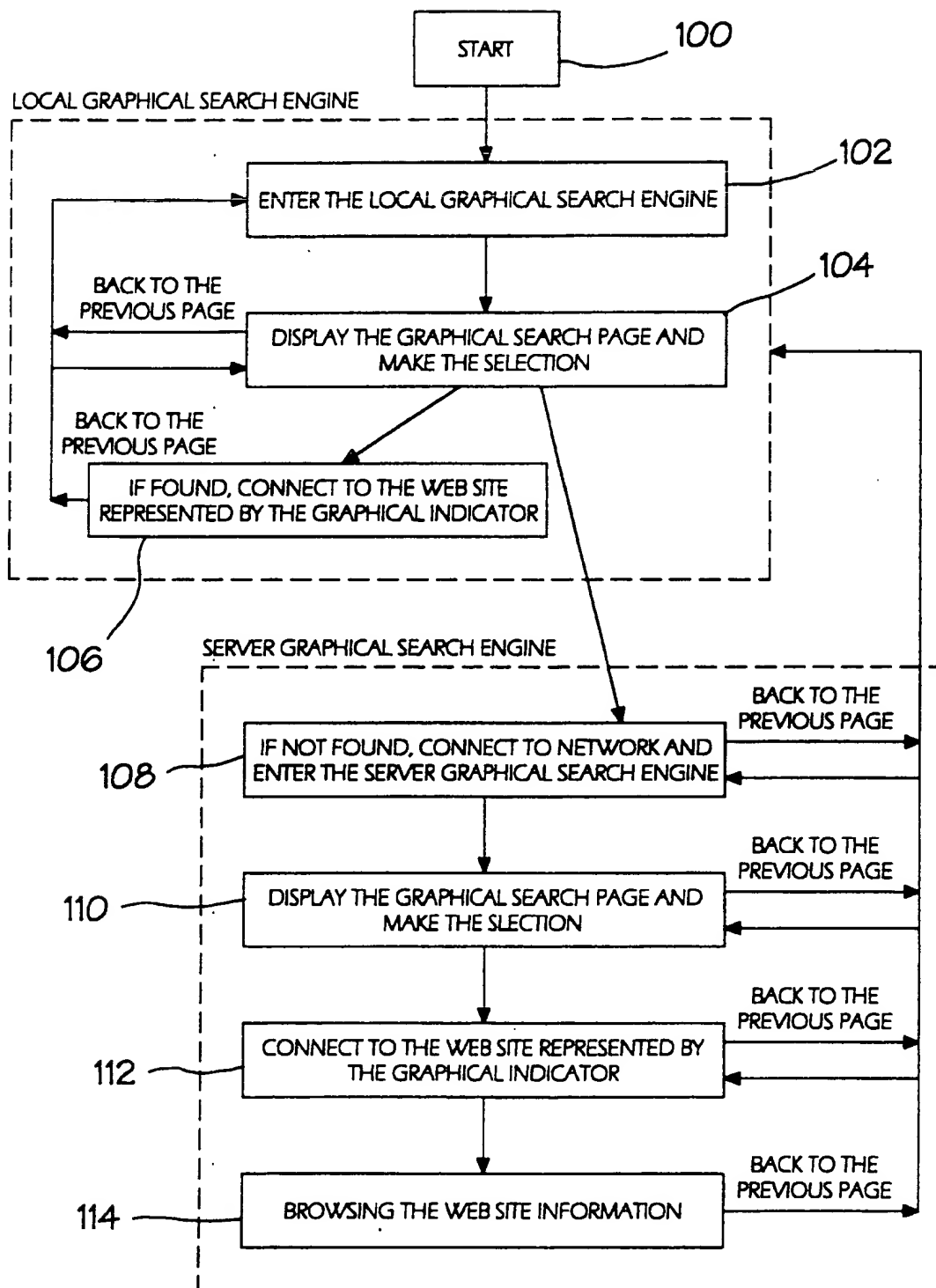
1 43. The method of claim 1 where said network includes networks used in
2 connection with televisions, telephones, PDA's (personal digital assistant).
3 vehicular information pads, cellular phones, banking machines, or toys.

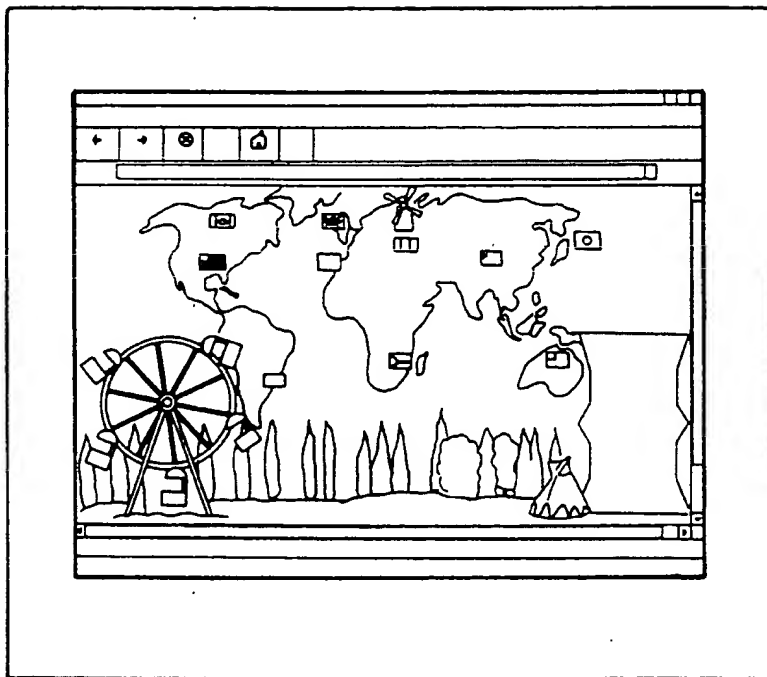
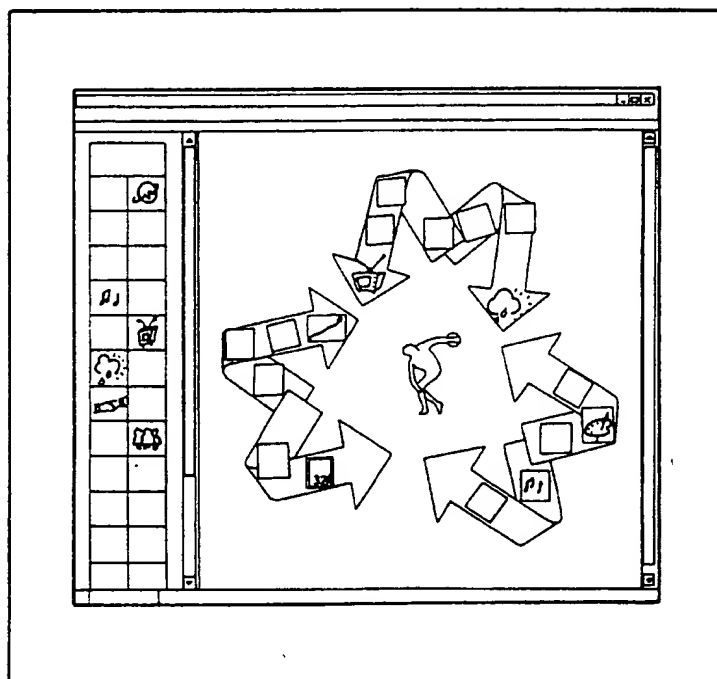
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*Fig. 1*

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*Fig. 2*

*Fig. 3**Fig. 4*

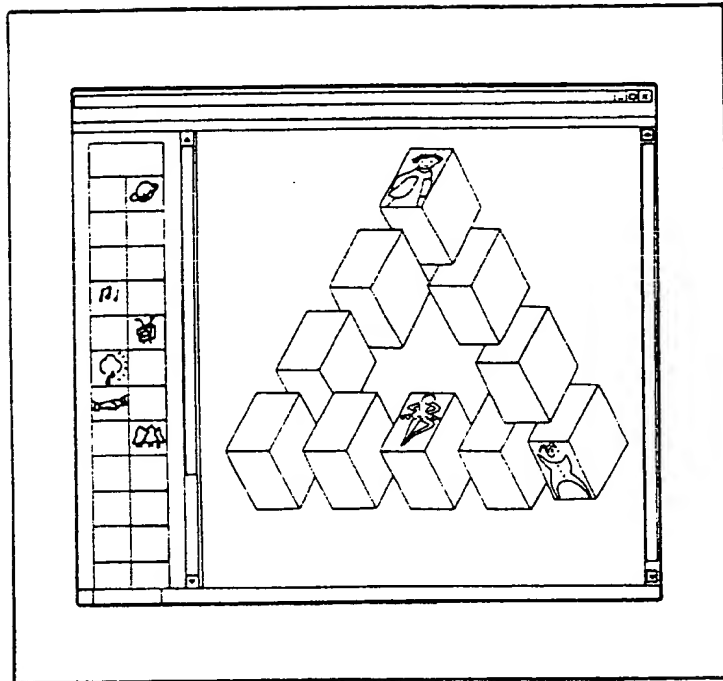
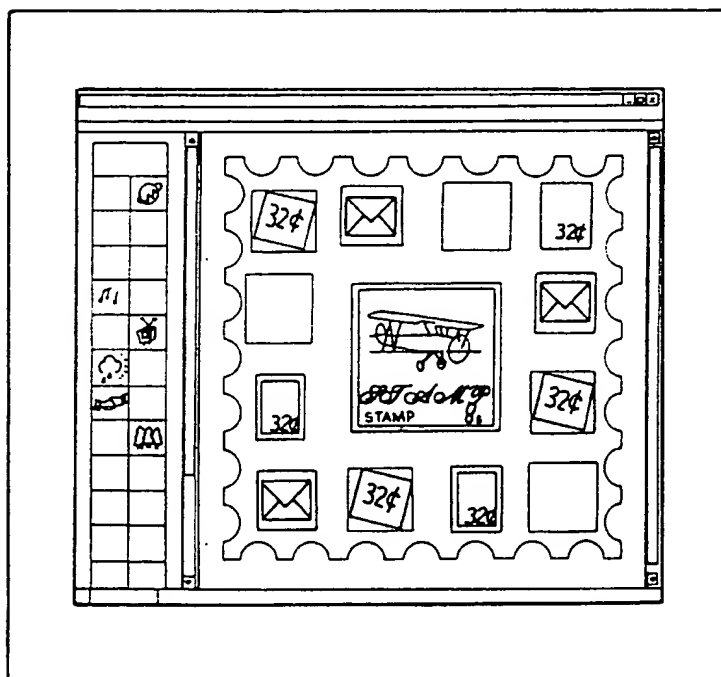


Fig. 5

Fig. 7



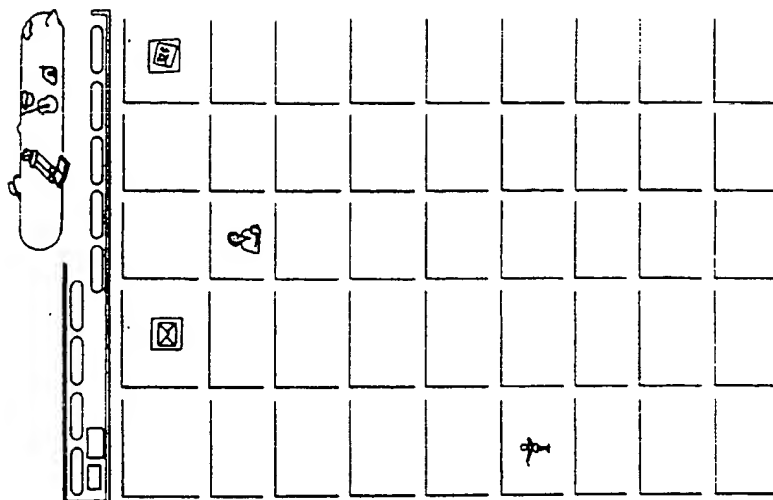


Fig. 3

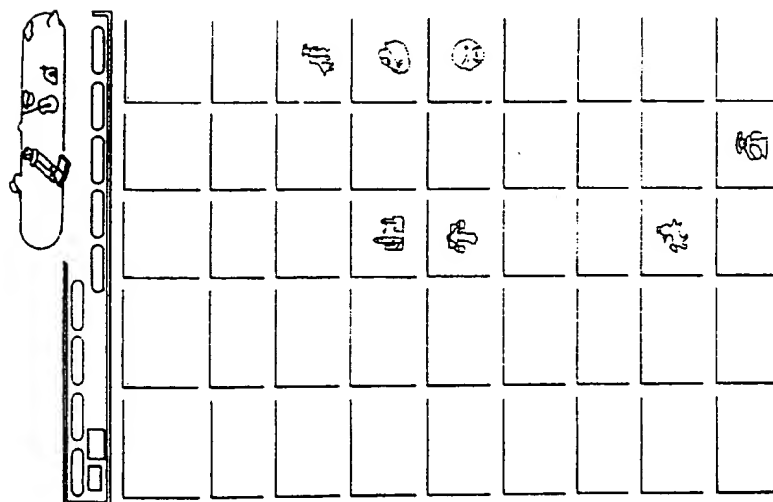
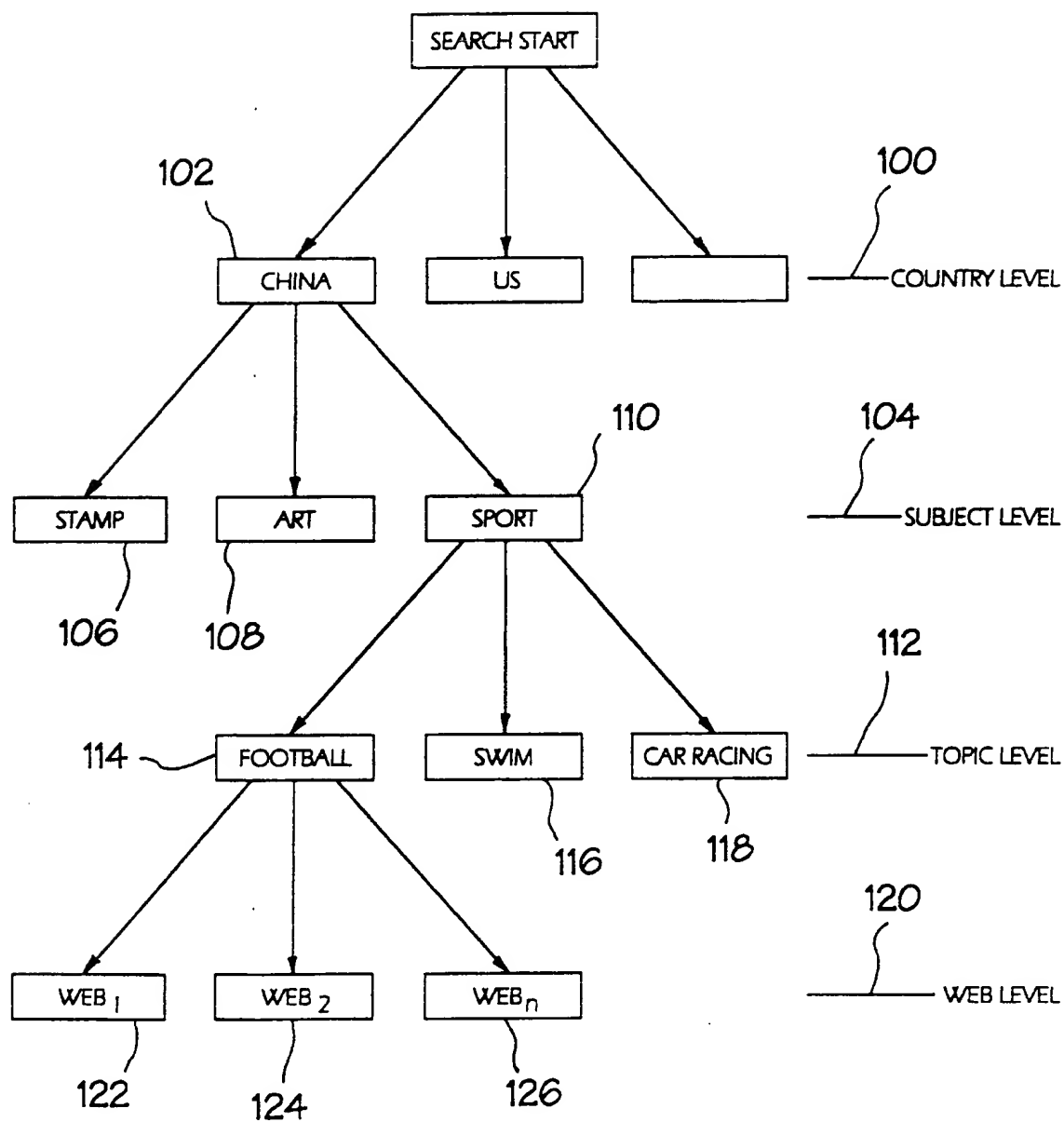


Fig. 6

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*Fig. 9*

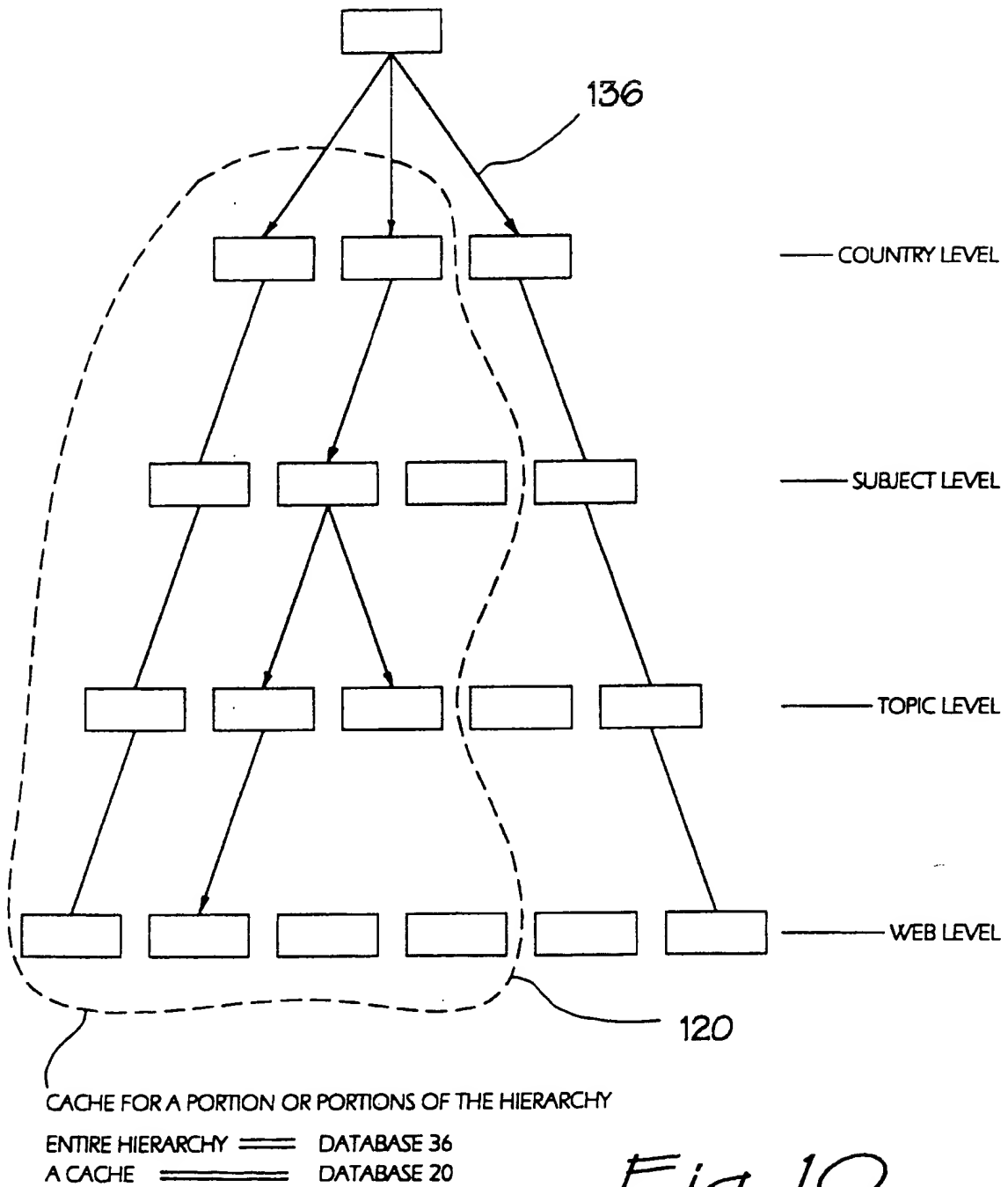


Fig. 10

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